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CASE REPORT

Rare Pediatric Meningoencephalitis Due to Streptococcus pneumoniae and Enterovirus Co-Infection: A Case Report and Review

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ABSTRACT

Meningoencephalitis is a major cause of pediatric hospitalization, with etiologies ranging from common to rare pathogens. Between April 2012 and August 2015, cerebrospinal fluid (CSF), serum, and respiratory samples from suspected cases were collected at Batna University Hospital, Algeria, and analyzed at the Institute of Infectious Agents in Lyon, France. We report an unusual case of meningoencephalitis in a 7-month-old infant presenting with fever, seizures, altered consciousness, and systemic manifestations. Laboratory investigations identified a co-infection with penicillin-resistant *Streptococcus pneumoniae* and Enterovirus, both detected in the CSF by culture and polymerase chain reaction (PCR). Brain imaging revealed cortical atrophy and ischemic lesions, while electroencephalography (EEG) demonstrated epileptiform activity. The patient was treated with broad-spectrum antibiotics, corticosteroids, and empirical acyclovir, which was discontinued after confirmation of Enterovirus infection. Clinical improvement was achieved; however, post-infectious epilepsy subsequently developed. This case highlights the potential for synergistic interactions between bacterial and viral pathogens in central nervous system infections. It underscores the need to consider mixed etiologies in severe pediatric presentations and emphasizes the value of comprehensive molecular diagnostic approaches to improve clinical management and outcomes.

Keywords: Meningoencephalitis, Streptococcus pneumoniae, Enterovirus, Co-infection, Infant, PCR, CSF.

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1. INTRODUCTION

Meningoencephalitis, characterized by inflammation of the meninges with altered mental status and/or focal neurological signs, is a frequent cause of pediatric hospitalization. Its etiology is often infectious, involving a broad spectrum of path ogens. Accurate diagnosis is challenging due to nonspecific clinical features and requires rapid biological investigations (1). Here, we report a rare case of infantile meningoencephalitis caused by a simultaneous infection with Streptococcus pneumoniae and Enterovirus. This case raises interest in potential viral-bacterial interactions affecting the central nervous system.

2. CASE PRESENTATION

A 7-month-old female infant with no notable past medical history and age-appropriate vaccinations presented on October 4, 2014, with fever, seizures, neck stiffness, and altered mental status. Examination revealed diarrhea, tachycardia, apathy, ac ute otitis media, and rhinorrhea, without rash or hemorrhagic signs.

Laboratory tests showed pancytopenia, CRP of 16.3 mg/L, procalcitonin 10.28 ng/mL, hyponatremia, hypochloremia, hypocalcemia, hypoproteinemia (42 g/L), and elevated liver enzymes. HIV serology was negative.

Brain CT revealed bilateral fronto-parietal cortical atrophy, while MRI identified a right semi-oval ischemic lesion with perilesional edema. EEG revealed sharp waves. CSF analysis showed 450 polymorphonuclear cells/mm³, hypoglycorrhachia, and elevated protein levels. CSF culture isolated penicillin-resistant Streptococcus pneumoniae (MIC 0.08 µg/mL). PCR targeting conserved regions identified both Streptococcus pneumoniae and Enterovirus in the CSF. The specific Enterovirus type could not be determined due to limitations in subtyping.

Treatment included acyclovir (discontinued once PCR confirmed Enterovirus), cefotaxime, vancomycin, and corticosteroids. The infant improved clinically but developed post-infectious epilepsy. Patient anonymity was strictly preserved, and informed consent for publication was obtained from the patient's family.

3. DISCUSSION

This case illustrates a rare co-infection of Streptococcus pneumoniae and Enterovirus causing meningoencephalitis in an infant. Co-infections of this nature are infrequently reported in the literature, and their pathophysiological implications remain underexplored.

Viral-bacterial interactions are well-documented, particularly for respiratory tract infections. Influenza virus, for instance, enhances pneumococcal adhesion and invasion via neuraminidase activity. Although Enteroviruses are not classically associated with middle ear infections, they are neurotropic and frequently implicated in pediatric encephalitis (2-4).

The presence of otitis media in our patient may represent a portal of entry for *S. pneumoniae*. Enterovirus co-detection raises the possibility of viral modulation of host defenses, contributing to bacterial invasion of the CNS. Studies in respiratory models support such synergism for other viruses, and a similar mechanism may be hypothesized here (5-8).

The clinical presentation, seasonal timing (October), and gastrointestinal symptoms are consistent with Enteroviral infection. The observed hypoglycorrhachia might result from the combined effects of both pathogens, although further mechanistic insights are lacking.

This case underscores the importance of considering mixed etiologies, particularly when clinical severity exceeds expectations. While our findings suggest a potential synergistic interaction, definitive evidence remains limited, and further research is required to characterize these dynamics in neuroinfections (9-11).

4. CONCLUSION

This case highlights a rare and clinically significant co-infection with Streptococcus pneumoniae and Enterovirus in an infant with meningoencephalitis. The findings emphasize the need to consider viral-bacterial synergy in neuroinfections and to integrate comprehensive molecular diagnostics in severe pediatric cases. Prospective studies are needed to elucidate the mechanisms and frequency of such interactions.

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